

PARTNERSHIPS IN WATER CONSERVATION

FEBRUARY 1997

WATERSHED CONSERVATION DEMONSTRATION PROGRAM

LOSTINE RIVER, OREGON

CARMAN RANCH GATED PIPELINE PROJECT

Partnership

The Bureau of Reclamation was asked by the Northwest Power Planning Council (NPPC) in 1991 to lead a cooperative effort with irrigators and State agencies. Irrigation water conservation demonstration projects in four areas of the Columbia River Basin were selected and designed. The projects are to test the "...physical, economic, environmental, and institutional viability of water conservation for improving instream flows and water quality in critical salmon production areas."

The Carman Ranch gated pipe project is one of several elements of the Wallowa River Basin Water Conservation Demonstration Project. This program meets NPPC objectives and was implemented through a support agreement with the Wallowa Soil and Water Conservation District, which coordinated project activities with private landowners and local, State, and Federal agencies.

Problem

The Lostine River is a tributary of northeastern Oregon's Wallowa River. These rivers support a population of spring chinook salmon listed as threatened

under the Endangered Species Act. There are fish passage problems on the Lostine River, including reaches of the river with very low flows, which are due in part to natural seasonal low flows and in part to the irrigation diversions which reduce river flows and present physical obstacles. The major water quality problems in the lower end of the river are high water temperatures, an excess of fine sediment, and excessive nutrient loading. Measures to mitigate these problems include reduction of overland return flows from irrigated land and feedlots, improved vegetation management along streambanks, and increased instream flows.

Lostine River water is diverted into the Clearwater Ditch at river mile 3 for distribution to about 35 users. The ditch provides water for further conveyance through the Chamberlin Ditch Pipeline into the Bear Creek drainage. The 1960 Wallowa Decree allows diversion of 5.5 acre-feet per acre during the irrigation season (1.5 acre-feet per month during May, June, and July; 1.0 acre-foot for August and September combined).

The Carman Ranch comprises 340 acres of the 1,620 acres of cropland and pastureland served by the Clearwater Ditch,

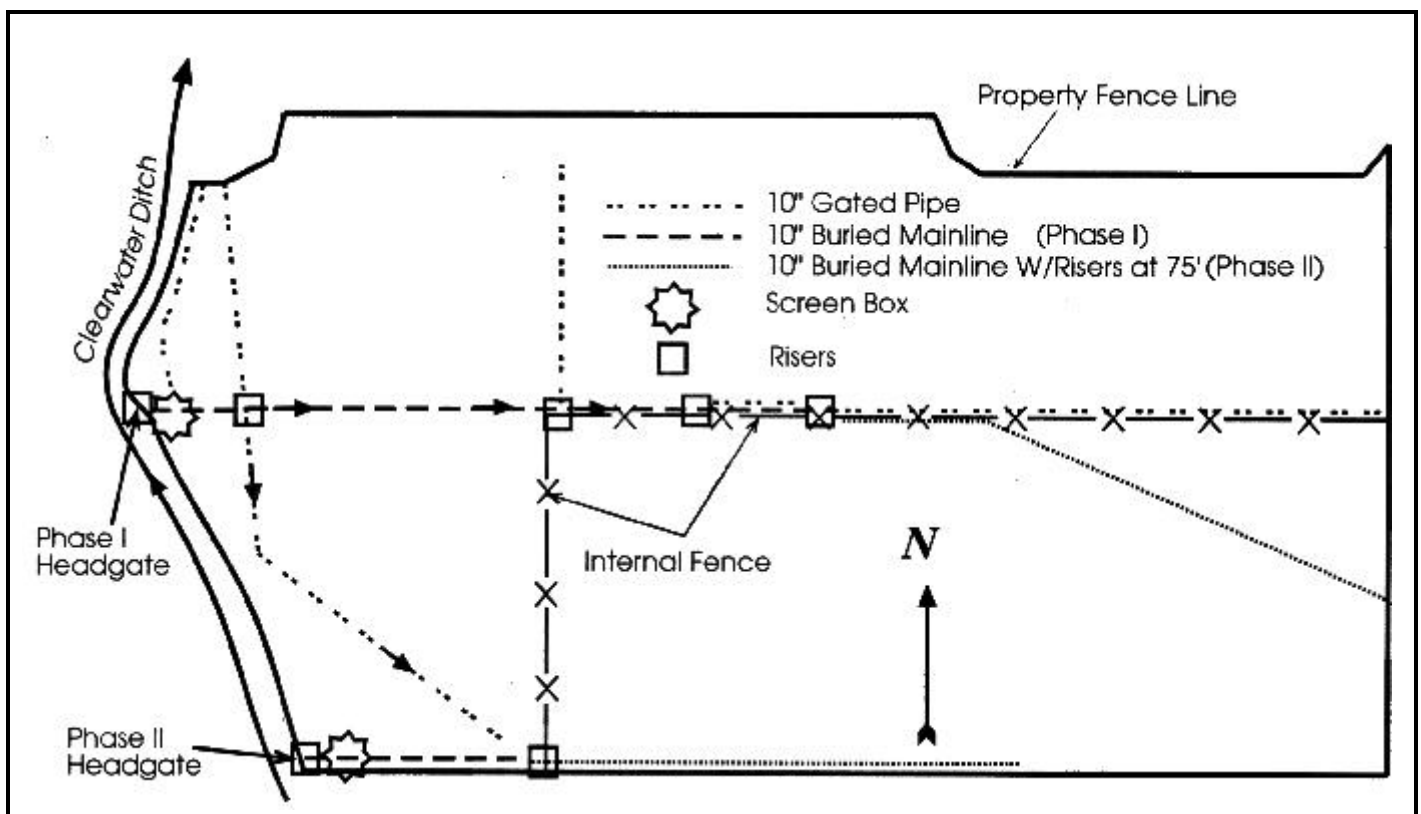
which marks the west side of the property (see map). Prior to this project, the ranch used an open flood irrigation operation, the most inefficient method of delivering and applying water. During application, the water flowed north and east; the irrigation waste water returned to the Lostine and Wallowa Rivers at several locations.

Project

The Carman Ranch Gated Pipe Project consisted of replacing the open flood irrigation operation with gated pipe. Project planning and coordination began in 1992.

Using slope and soil characteristics, an irrigation system and schedule was developed for the Carman Ranch by the Natural Resources Conservation Service (NRCS) office in Enterprise. The system was devised to produce adequate water for pasture irrigation without causing the deep percolation and excessive runoff that can occur with traditional flood irrigation.

Implementation of the project was planned for two phases and included procedures for comparing the changes in methods of applying irrigation water. Phase 1 was designed to compare the



results of flood irrigation to a gated pipe system.

Phase 1 began with the designation of southeast field (150 acres) as the “control” — the basis of comparison; it continued to receive open flood irrigation and to be used for growing grass hay (150 acres). Water for these fields continued to be released through the southwest headgate (no. 2) and conveyed through a ditch. The north and west sections of the ranch were selected for “test” fields—(130 acres of hayland and 60 acres of pasture).

Construction started in August 1994 and the gated pipe system became operational the next month. The northwest headgate (no. 1) from the Clearwater Ditch was upgraded and a screen-box to prevent weeds and debris from entering the pipe lines was constructed about 30 feet away. A 3,500-foot-long, buried mainline pipe was installed to convey water to four separate surface runs (laterals) of gated pipe, totaling about 6,600 feet. “Universal hydrant” valves (see figure 1) rose above ground level at the junction point of each lateral with the mainline. The gated pipes



Figure 1. Example of a typical universal hydrant which fits on top of an alfalfa pasture valve, and allows flows into portable surface gated pipe or through the outlet for directional flow.

were connected to the hydrant valves for delivery of irrigation water to the test parcels. The pipes have manually operated slide gates, spaced every 30 inches, so that the water supply for surface irrigation can be timed and controlled. Because the pipelines were installed in the middle of the 1994 irrigation season, Phase 1 was continued through the 1995 irrigation season so there would be more information on which to evaluate the changes.

Phase 2 was implemented in 1996. A system of pipe irrigation was installed in the southeast (control) field. The eastern segment of the surface gated pipe was replaced by a buried line with “risers,” 8-inch pasture valves (see figure 2) installed every 75 feet to provide water to the field. Also, a buried mainline pipe was

installed from the reconstructed headgate No. 2 to the closest corner of the control field. From that point, the pipe continued inground with risers every 75 feet. It is anticipated that the use of pasture valves will be as efficient as gated pipe, cost less to install, require less labor for the rancher, and provide more livestock feed.

Implementation Difficulties

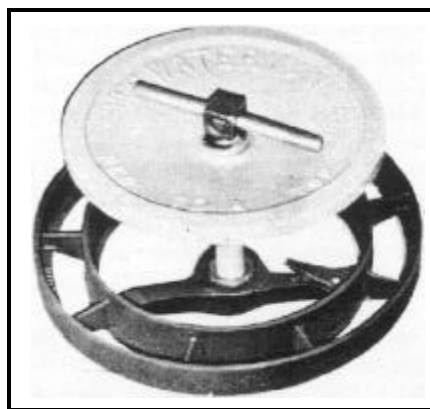


Figure 2. A typical alfalfa pasture valve, which attaches to a riser connected to buried mainline pipe. Attachments can be placed over the valve for various irrigation application options.

The installation of the buried pipe was hampered by a water table beginning 3 feet below ground surface. The shallow water table was a result of a layer of heavy clay ponding from excess water applied during irrigation. The water table made it difficult to join pipe sections and necessitated immediate backfilling to keep the pipe from floating.

During the 1995 irrigation season, there was a break in the Clearwater Ditch and the test field with the pipe system was flooded, leading to inconclusive data.

The gated pipe was easy to install and operate. However, during the winter of 1995–96, winds caused the pipe to separate and be blown across the fields. The gated pipe is now held in place with hoops similar to croquet wickets to avoid this problem.

Monitoring

Base data comparing the two systems (flood and pipe) was established during Phase 1. The amount of water used will continue to be monitored, along with

changes in crop production. Phase 2 took place when the ranchowner converted the balance of the irrigation system from flood application to a pipeline with pasture valves. Water use, crop yields, application efficiency, and costs have been and will continue to be recorded and compared.

Results

Water savings — The project has resulted in a significant reduction in water usage on the Carman Ranch. For the first phase of the project, when there was both flood irrigation and water application with gated pipe, water use was recorded by a flow meter installed in the buried pipeline. During the Phase 1 irrigation seasons (1995 and 1996), water use averaged 3.3 acre-feet per acre, significantly less than the 5.5 acre-feet per acre decreed right.

Yield increases — In 1996, the first full year of Phase 1 operations, production on the hayland irrigated with gated pipe averaged 2.9 tons of grass hay per acre. Production on unimproved flood irrigated acres averaged 1.6 tons of grass hay per acre.

Cost

The total budget for the Carman Ranch gated pipe project was almost \$81,000. Ranch owner Luke Carman paid \$12,000 (15 percent) which covered some installation costs of the system. Reclamation provided \$40,000 (50 percent) for materials and installation. Grande Ronde Model Watershed Health program provided \$19,000 (23 percent) for materials and installation, and the predecessor of the Farm Service Agency paid \$9,500 (12 percent) for materials.

Plan Benefits

The Carman Ranch Gated Pipe Project provided many benefits:

- It demonstrated that water applied more evenly and more efficiently can increase crop yields.
- It provided controllable, consistent, and accurate delivery of the water right.
- It reduced the need to divert 5.5 acre-feet per acre from the Clearwater ditch to 3.3 acre-feet per acre.
- It improved water quality in the Lostine River by reducing tailwater return flows and reducing sediment yield.

Other information sheets in the series about the Wallowa River Basin Water Conservation Demonstration Project include the Tulley Hill, the Clearwater Ditch, and the Lower Valley diversion projects. For further information about these or the Carman Ranch gated pipe project, contact:

- Tom Smith, Soil Conservation Specialist, Natural Resources Conservation Service, 201 W. North St., Enterprise OR 97828. Phone 541-426-4588; fax: 426-4789.
- Jack Haynes, Water Conservation Specialist, Bureau of Reclamation, 1150 N. Curtis Road, Boise ID 83706-1234. Phone 208-378-5225; fax 378-5305.
- Ron Golus, Program Manager, Snake River Area Office, Bureau of Reclamation, 214 Broadway Ave., Boise ID 83702. Phone 208-334-1751; fax 334-9562.